Hungerford's Crawling Water Beetle
Recovery Outline

Species Name: Hungerford's crawling water beetle (*Brychius hungerfordi*)

Classification: Endangered

Federally listed: March 7, 1994

Recovery Priority Number: 5

Population Trend: Unknown

Lead Region/Cooperating Regions: R3

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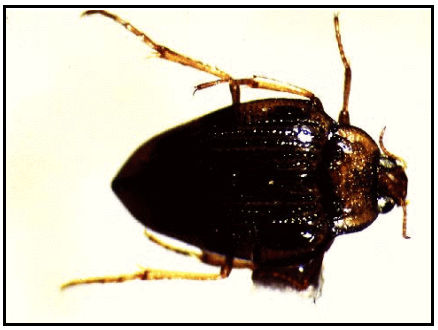

Figure 1. Hungerford's crawling water beetle. Photo by R.M. Strand

Purpose and Use of this Recovery Outline:

In the interim between listing and recovery plan approval, a recovery outline provides preliminary strategies for conservation that conforms to the mandates of the Endangered Species Act, as amended. It organizes near-term recovery actions, provides a range-wide conservation context for Service decisions, and sets the stage for recovery planning and stakeholder involvement.

Note on Information Sources and Treatment of Uncertainties:

This recovery outline is based on available data, including the original listing decision (59 FR 10580, March 7, 1994). Despite some studies and extensive surveys in Michigan, Wisconsin, Minnesota, and Ontario, little is known about the biology, diet, life history, and habitat preferences of this beetle (see Species Description and Life History).

I. Species Information

Distribution and Land Ownership Pattern:

Hungerford's crawling water beetle occurs in only five known locations (Figure 2): four in Michigan and the fifth in Canada.

Emmet County

East Branch of the Maple River: The beetle is found in several areas of the river: from the Douglas Lake Road crossing (T37N, R4W, section 25) downstream for approximately two and a half miles until near the pipeline crossing (T36N, R4W, section 11). The Regents of University of Michigan own the majority of land surrounding this stretch of the river (Rockford Map Publications 1999). In addition, Emmet County (Emmet County Forest) owns one tract of land, and private individuals own two small sections.

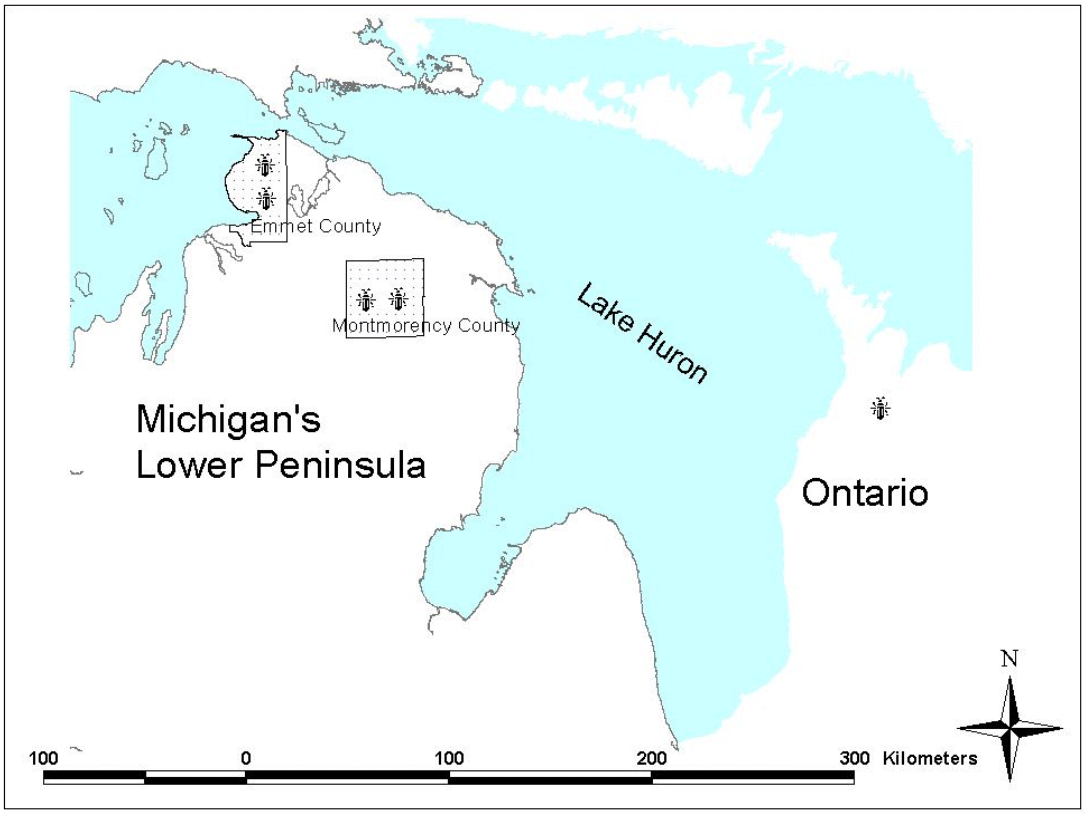

Figure 2. Hungerford's crawling water beetle distribution.

Carp Lake River: This site occurs near the Oliver Road crossing (T39N, R4W, section 32, southwest ¼). The property ownership in this section represents a mix of private (one landowner) and public property (State of Michigan) (Rockford Map Publications 1999).

Montmorency County

East Branch of the Black River: State of Michigan property (Mackinaw State Forest) surrounds this site (T32N, R1E, section 26) (Mackinaw State Forest) (Michigan Natural Features Inventory 2003, Montmorency Conservation District 2001).

Van Hetton Creek: State of Michigan property (Pigeon River County State Forest) surrounds this site (T31N, R2E, section 5) (Montmorency Conservation District, 2001, Michigan Natural Features Inventory 2003).

Bruce County, Ontario

North Saugeen River: This site is in south central Ontario, Bruce County, in the village of Scone (Roughley 1991). The property ownership at this site is not known.

Population Status:

In spite of current and potential threats, its small population size and limited distribution, the Hungerford's crawling water beetle remains in all originally discovered locations, and, since its listing in 1994, has been discovered in two additional locations. Currently, population estimates are uncertain. A preliminary mark-recapture study conducted at one location in the East Branch of the Maple River

estimated the population at over 1,000 individuals in that pool during July 2001 (R. Vande Kopple, University of Michigan Biological Station, pers. comm.). The East Branch of the Maple River has the largest known population of this species. The populations of the other Michigan locations are estimated to be in the dozens to hundreds.

Historic Distribution:

The distribution of Hungerford's prior to its discovery in 1952 is not known. Recently, a museum specimen collected in 1953 in Cheboygan County was discovered; however, the specimen was not labeled with an exact location (T. Mousseau, University of Manitoba, pers. comm.). Additional efforts to examine museum specimens are needed to help determine the historic range of the species.

Species Description and Life History:

Hungerford's crawling water beetle is a member of the Haliplidae family (Order Coleoptera). Adult beetles are small and torpedo-shaped, with an average body length of 0.15-0.17 inches (3.8-4.3 mm). They are yellowish brown in color, with irregular dark markings and narrow longitudinal stripes on the wing covers. The females tend to be larger than the males (Spangler 1954). Larvae are light yellowish-brown with a hooked tail and elongated, cylindrical body (Strand and Spangler 1994).

Hungerford's crawling water beetles are generally found at depths of a few inches to a few feet in streams that are relatively cool (15E to 25EC) with moderate to fast flow. Adults tend to be found crawling around cobble near the edge of pools and/or associated with mats of algae in riffles. They have been found in the riffles downstream from culverts, beaver and natural debris dams, and human-made impoundments. Adults and larvae are seldom captured together and they appear to inhabit different microhabitats in the stream. Larvae are commonly found on or near algae in the genera *Chara, Nitella,* and *Cladophora*.

Little is known about the biology of this beetle. Adult beetles appear to respire air from a bubble held beneath their elytra (wing covers) and the fused metacoxal plates of their hind legs, which they must replenish periodically at the surface. Adult Hungerford's are strong swimmers. Their ability to fly is uncertain. The diet of Hungerford's crawling water beetle is not known at this time. It has been previously reported that algae, periphyton, and/or diatoms are the likely principal food source(s). Recent research, however, examined frass (fecal pellets) of the beetles and did not find any identifiable filamentous algal or diatom fragments (Scholtens 2003). Future research is needed to conclude the food habits for this species.

The life history of the species is not yet fully understood. Recent research has examined the life history of a closely related, con-generic species found in Manitoba, *Brychius* sp. (Mousseau and Roughley in press). A population of *Brychius* sp. from the Duck Mountains, Manitoba, was observed in the lab and field. Adults mated in June and oviposition occurred in June and July. *Brychius* sp. overwinter in the larval stage and pupate in March. Adults emerge in May. The life history of Hungerford's crawling water beetle may be the same, or very similar, to this species.

Seasonal abundance has been examined in Hungerford's crawling water beetles in the East Branch of the Maple River. Strand and Spangler (1994) reported adults were present from June to August, 1989, but became increasingly difficult to find in late July and August, and only larvae were found in October. The decline in adults corresponded with a drop in water level. A more recent study in the East Branch of the Maple River reports adults surviving through the winter, and suggests that several generations may be present in a single season (Grant et. al 2000). There was an increase in relative abundance of adults in May, 2000, followed by a second increase in August with a peak in October.

Threats:

At the time of listing in 1994 (59 FR 10580), Hungerford's crawling water beetle was known to occur in only 3 isolated locations, despite extensive surveys in Michigan, Wisconsin, Minnesota, and Ontario. Modification and destruction of habitat were listed as threats to the species, potentially resulting from fish management, sedimentation, logging, beaver management, stream modification, stream pollution, and general stream degradation. Collection may also be a potential threat, as rare insects are often considered valuable to amateur scientific collectors; however, the collection threat for Haliplid beetles is probably minimal. Small population size and limited distribution increase the potential for extinction from stochastic natural events and/or human disturbance.

Key Information Needs for Recovery of the Species:

Range and population numbers

- ~ Are there additional populations of Hungerford's crawling water beetle?
- ~ Can we identify a historic range for this species?
- ~ What are population estimates for each known population?
- ~ What are the population dynamics of the species at each site?

Habitat

- ~ What are the key habitat components for this species?
- ~ Develop list of other areas of potential suitable habitat for the beetle
- ~ What areas are most important for habitat protection?
- ~ What areas are important for habitat enhancement?

Life History and ecology

- ~ Determine the life history of this species
- ~ What are the species' food habits?
- ~ What are the details of their reproduction, survival, and mortality?
- ~ Do they have natural dispersal mechanisms?
- ~ Confirm breathing mechanisms; do they surface for air?

Threats

- ~ What are the current threats to the species at each site and how do we minimize these threats?
- ~ Is lampricide treatment a threat to the species?
- ~ To what degree is predation an issue?

II. Recovery Plan (Plan) Preparation

A. Plan Development:

The US Fish and Wildlife Service (Service), East Lansing Field Office will initiate the preparation of the Recovery Plan for Hungerford's crawling water beetle in 2003. This Recovery Outline is the initial step in this process and will provide a strategy and timeline for the recovery planning effort. *Scope of the Recovery Effort*: single-species.

B. Plan Authorship:

Service staff will provide primary authorship of the Recovery Plan, with the assistance of species experts and stakeholders. The Service will seek input from all persons interested in or potentially affected by recovery of Hungerford's crawling water beetle. Interested individuals will serve as a source of information and may provide additional perspective on the issues of importance to recovering the species. In addition to appropriate State agencies, stakeholders may include other federal agencies, non-government organizations, species experts, and private landowners

that may be able to assist with the recovery and/or have an interest in the protection of this species.

C. Plan Coordination:
In addition to private landowners, the following people are potential stakeholders in the recovery of this species. The Service has initiated contact with those individuals that have expressed some interest in participating in the recovery planning process. These individuals will assist in gathering information relevant to recovery and provide input throughout the process. They may be to asked attend appropriate meetings to provide their individual opinions and to serve as sources of additional information and expertise as the Plan is drafted. This is not an exhaustive list and will be updated as additional stakeholders are identified. In addition, a public comment period will open when a notice of availability for the approved draft recovery plan is published in the *Federal Register.* We will seek peer review from at least three independent non-FWS species experts during the public comment period.

Andrea Kline, The Nature Conservancy, Michigan Chapter, Lansing, MI
Brian Scholtens, College of Charleston, Charleston, SC
David Cuthrell, Michigan Natural Features Inventory, Lansing, MI
David White, Murray State University, Hancock, Kentucky
Joe Holomuzki, Ohio State University, Mansfield, OH
John Weisser, US Fish and Wildlife Service, Marquette Biological Station, Marquette, MI
Laura Kuehn, Conservation Resource Alliance of Traverse City, MI
Leon Hinz Jr., University of Michigan, Ann Arbor, MI
Michael Grant, University of Michigan Biological Station, Pellston, MI
Michael Wiley, University of Michigan, Ann Arbor, MI
Pat Lederle, Michigan Department of Natural Resources, Lansing, MI
Patrick Hudson, U. S. Geological Survey, Great Lakes Science Center, Ann Arbor, MI
Rob Roughley, University of Manitoba, Winnipeg, Manitoba
Robert Vande Kopple, University of Michigan Biological Station, Pellston, MI
Roger Strand, Northern Michigan University, Marquette, MI
Tonya Mousseau, University of Manitoba, Winnipeg, Manitoba
US Fish and Wildlife Service, East Lansing Field Office Staff, as assigned
Wil Cwikiel, Tip of the Mitt Watershed, Petosky, MI

D. Recovery Plan Completion:

Technical/Agency Draft anticipated: November 2004
Final Recovery Plan anticipated: August 2005

III. Anticipated Recovery Actions:
Research, surveys, monitoring of extant populations, and habitat protection represent key components for recovery of Hungerford's crawling water beetle. Threats to the species will need to be clarified, monitored, and minimized. Public outreach, coordination with landowners, and cooperation with conservation organizations are also important to the recovery of the species.

A. Anticipated Research/Studies:
Initial recovery actions will involve additional survey work and research. Little is known about the biology and life history of Hungerford's crawling water beetle. We will need to have a better understanding of the species' life history, habitat requirements, distribution, and ecology in order to adequately protect the species. Surveys should be conducted to identify any additional populations.

The threats to the species will need to be further defined and evaluated. Stream modification is currently considered a serious threat to the species and will need to be addressed in the recovery plan. Additional research will be needed to determine if other threats exist. For example, research may examine the potential effects of lampricide treatment upstream of Hungerford's sites.

B. Enhancement, Protection, and Acquisition of Habitat:
Potential destruction of habitat is thought to be the primary threat to the species. Hungerford's crawling water beetles usually live in cobble or embedded gravel beds in the riffles of streams. The removal or modification of structures that can create this riffle environment (beaver dams, man-made dams, culverts, etc.) can remove suitable habitat for the beetle. In some areas, habitat enhancement may be beneficial, and could include creating artificial structures to create well-aerated sections of stream in areas that otherwise appear to be suitable habitat. Before we can properly implement habitat protection and/or enhancement measures, however, we will need to gain a better understanding of the species' habitat requirements.

Land acquisition will most likely play a minor role in the recovery of this species.

C. Develop Participation Plans
Participation Plans describe the implementation of one or more recovery tasks identified in a recovery plan and serve as outlines for various stakeholders when implementing recovery actions. Participation Plan needs will be identified and utilized throughout the recovery planning process as needed.

D. Develop Habitat Conservation Plan(s):
Private landowners, corporations, state or local governments, or other non-Federal landowners who wish to conduct activities on their land that might incidentally harm (or "take") a species listed as endangered or threatened must first obtain an incidental take permit from the Service. To obtain a permit, the applicant must develop a Habitat Conservation Plan (HCP), designed to offset any harmful effects the proposed activity might have on the species. The HCP would focus on immediate and long-term management to protect and recover the species. For example, a potential HCP could be developed with a landowner that was interested in stream bank restoration and/or maintenance of an eroding stream crossing. There are currently no HCPs in place for this species.

E. Outreach:
Outreach is an important component of the recovery planning process. The general public is currently unaware of the Hungerford's crawling water beetle. Outreach activities will be conducted in order to build community support for relevant recovery actions. News releases, media coverage, brochures, slide presentations, and displays should be utilized to inform agency personnel, landowners, and the general public about Hungerford's crawling water beetle.

F. Additional Management Actions:
The feasibility of controlled propagation and potential reintroductions, as a management option, may be examined once the biology and habitat requirements of the species are better understood.

G. Other Agreements:
A landowner contact program may be established to obtain voluntary habitat protection agreements with private landowners. Other potential agreements could be sought with local fire departments who may pump water from streams where Hungerford's is found. We may also

want to establish an agreement with the County Road Commissions in areas where Hungerford's crawling water beetle may be affected by road work.

H. Coordination and Consultation with Federal Agencies:
Section 7 of the Endangered Species Act requires all Federal agencies to consult with the Service on actions that may affect listed species. Intra-Service section 7 consultations should be conducted when Service fish management and habitat restoration activities occur near known Hungerford's locations (e.g. lampricide treatment). Intra-Service consultation is also necessary when a section 10 permit is issued. Inter-Agency consultation will occur when other Federal agencies propose actions that may affect the species. The Army Corps of Engineers may consult with the Service when projects that may potentially affect Hungerford's crawling water beetle occur under their regulatory jurisdiction, including projects involving barrier removal or introduction. There are currently no Inter-Agency consultations occurring for this species.

There is a potential for coordination with the US Forest Service for surveys of potential Hungerford's habitat in the National Forest system.

I. Coordination with State Agencies and Local Governments:
Coordination with the State of Michigan will be critical to implementing recovery actions, including protection of habitat adjacent to State properties. Water quality is important to the survival and recovery of Hungerford's, so coordination with Michigan Department of Environmental Quality (DEQ) will also be an important component of future recovery efforts. State agencies, including the Department of Natural Resources (DNR) and DEQ, will be invited to participate in Plan development. In addition, research activities and surveys have the potential to be funded through state grants.

Attempts should be made to coordinate with County Road Commissions for road projects that occur near the streams that this beetle inhabits.

J. Coordination with Private Entities:
We anticipate coordination with environmental groups that have an active interest in conservation of the beetle and/or its habitat (e.g. The Nature Conservancy, The Conservation Resource Alliance of Traverse City, Tip of the Mitt Watershed), as well as with local landowners and private individuals. Universities will be utilized to assist the Service with the research component of recovery actions.

K. Interim Recovery Activities
The Service will continue to work with partners to advance the knowledge and conservation of Hungerford's crawling water beetle during recovery plan development. Surveys will be conducted to examine the current range of the species and look for additional populations and areas of suitable habitat. The Service will investigate the historic distribution of Hungerford's by pursuing recent leads on museum specimens that have been identified as *Brychius*. Research will be conducted to address key research questions, as funding permits. Outreach will be a priority, and State agencies and other stakeholders will be contacted and invited to participate in recovery planning and implementation activities.

For areas where the species is known to occur, the Service will consider Hungerford's crawling water beetle when reviewing 404 permit applications. In addition, the Service will increase coverage of Clean Water Act issues by requesting review of section 402 permits under consideration for occupied stream segments. Recovery of Hungerford's will also be considered during section 7 consultation and HCP development, as appropriate.

L. References:

Grant, M., Vande Kopple R., and Ebbers, B. 2000. New distribution record for the endangered crawling water beetle *Brychius hungerfordi* (Coleoptera: Haliplidae) and notes on seasonal abundance and food preferences. The Great Lakes Entomologist 33&34: 165-168.

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Rockford Map Publications. 1999. Emmet County Plat Book. Rockford Map Publishers, Rockford, IL.

Roughley, R. E. 1991. *Brychius hungerfordi* Spangler (Coleoptera, Haliplidae), the first record from Canada with notes about habitat. The Coleopterists Bulletin 45(3): 295-296.

Scholtens, B. 2003. Preliminary report on the distribution and biology of Hungerford's crawling water beetle (*Brychius hungerfordi* Spangler). U.S. Fish and Wildlife Service, Unpublished report.

Spangler, P. J. 1954. A new species of water beetle from Michigan (Coleoptera, Haliplidae). Ent. News LXV(5): 113-117.

Strand, M., and P.J. Spangler. 1994. The natural history, distribution, and larval description of *Brychius hungerfordi* Spangler (Coleoptera: Haliplidae). Proc. Entomol. Soc. Wash. 96(2): 208-213.

Approved:_____

Robyn Thorson, Regional Director, Region 3 Date
U. S. Fish and Wildlife Service